PMC-ND
(1.08.09.13)

U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION

RECIPIENT: University of Delaware **STATE:** DE

PROJECT TITLE: Novel and effective surface passivation for high efficiency n- and p-type Si solar cell

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0001840 FY18 SETO FOA	DE-EE0008554	GFO-0008554-001	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

A9 Information gathering, analysis, and dissemination	Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
B3.15 Small-scale indoor research and development projects using nanoscale materials	Siting, construction, modification, operation, and decommissioning of facilities for indoor small-scale research and development projects and small-scale pilot projects using nanoscale materials in accordance with applicable requirements (such as engineering, worker safety, procedural, and administrative regulations) necessary to ensure the containment of any hazardous materials. Construction and modification activities would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible).
B3.6 Small-scale research and development, laboratory operations, and pilot projects	Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to the University of Delaware (UD) to develop a novel passivation method (the application of a protective surface coating) for solar photovoltaic (PV) waters and characterize the ability of treated materials to withstand certain types of corrosive downstream processing techniques used in the industrial production of solar cells and devices.

The proposed project would be limited to data analysis, computer modeling, and various small-scale research and development (R&D) tasks performed within controlled laboratory settings. All work would occur indoors at three dedicated university research facilities located at UD (Newark, DE), Georgia Institute of Technology (GIT; Atlanta, GA), and the University of Nevada (UNLV; Las Vegas, NV). Wafer cleaning and passivation would occur at the UD Institute of Energy Conversion. Dopant diffusion as well as cell structure development and metallization would be carried out at GIT. Surface characterization of materials and device prototypes would be conducted by UNLV utilizing on-campus facilities in addition to specialized equipment located at Lawrence Berkeley National Laboratory (LBNL; Berkeley, CA). Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

The proposed project would involve the use and handling of various hazardous materials including toxic and flammable gases, concentrated acids and bases, and solvents. Such handling would be conducted entirely within

properly equipped and ventilated laboratories following existing health and safety policies and procedures, such as employee training, the utilization of personal protective equipment (PPE) and Safety Data Sheets (SDS), strict adherence to equipment-specific Safe Operating Procedures (SOPs), and regular inspections. Project participants are experienced researchers trained in the proper use, storage, handling, and disposal of these types of materials. Further, hazardous materials would continue to be managed in accordance with relevant Federal, state, and local environmental regulations as ensured by the responsible oversight department/office at each institute. All facilities in which project work would occur have dedicated hazardous material disposal practices to include on-site collection and treatment systems for the types and quantities of chemical waste that would be generated by the proposed activities.

The proposed project would also involve the use of nanoscale materials in the structure of fabricated solar cell prototypes. These approximately 2–100 nm thick amorphous-silicon based thin films pose no risk to employees as they are well adhered and encapsulated by thicker electrical contact films in the final device structure. The device itself would be safe to handle, and any spent material would treated as solid non-hazardous waste requiring no special treatment actions. Minimal disposition of non-hazardous materials (beyond standard amounts of used laboratory supplies and wastewater) is expected under this project overall because processed materials/fabricated devices would likely be stored for future research.

Proposed activities would not exceed the scope and nature of past and ongoing activities at these locations. At all locations, the anticipated quantities of materials to be used and produced by project-related work would not exceed bench-scale metrics. The facilities in which project work would occur were purpose-built for the types of activities being proposed; therefore, no physical modifications or new equipment installations would be required. The Recipient and subrecipients have all applicable permits in place, and would not need additional permits for the proposed activities. No change in the use, mission or operation of existing facilities would arise out of project efforts.

NEPA PROVISION

DOE has made a final NEPA determination.

Include the following condition in the financial assisstance agreement:

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

Notes:

Solar Energy Technologies Office
This NEPA determination requires a tailored NEPA Provision.
NEPA review completed by Whitney Doss, 12/21/2018

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.
There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.
The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

The proposed action is categorically excluded from further NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature: Electronically Signed By: Kristin Kerwin Date: 12/26/2018

NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- [x] Field Office Manager review not required
- [ ] Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____

Field Office Manager